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FUNCTIONAL MEASURE SCORES IN OLDER AMBULATORY ADULTS WITH HIGH LEVELS OF SERUM 25-HYDROXY VITAMIN D

To the Editor: The traditional role of vitamin D as an essential element in maintaining bone health is well documented, but the discovery of vitamin D receptors (VDRs) in many types of human tissue has opened up possible roles for vitamin D in a range of health conditions.¹ Vitamin D's role in maintaining muscle strength through VDRs located on skeletal muscle has revealed yet another important role for vitamin D in health.² Poor muscle strength is of particular concern for aging populations, because it leads to poor balance and body sway, which heighten the risk of a fall and associated low-impact fracture.³

Until recently it was generally assumed that vitamin D insufficiency (<50 nmol of serum 25-hydroxy vitamin D (25(OH)D)) in healthy, ambulatory Australian adults was rare, mainly because of high average ultraviolet light exposure in this country,⁴ but recent research has shown that vitamin D insufficiency is surprisingly common in this population,^{5,6} thus potentially putting older adults at risk of poor functional capacity and risk of falls and fractures. The objective of the present study was to evaluate the relationship between serum 25(OH)D status and functional measures in a group of older ambulatory adults.

A representative convenience sample of participants (N547; 26 women, 11 men) aged 55 and older (70.2 ± 8.7) was recruited for this cross-sectional exploratory study. The catchment area for participant recruitment was within 100km of the Brisbane Central Business District (27.5S, 151.5E). Functional performance of adults was assessed using the 3-m Timed Up and Go (TUG) test and handgrip dynamometry. Serum 25(OH)D status and blood measures of calcium, phosphorus, and albumin were determined through blood tests. Bivariate correlations tested for associations between 25(OH)D status and continuous independent variables, and independent-sample t-tests and one-way analysis of variance tests tested associations between categorical independent variables and 25(OH)D status. Independent variables that displayed significant associations at the bivariate level or displayed near-significant trends were included in the multivariable linear regression to identify independent determinants of 25(OH)D status.

For bivariate and multivariable analyses, a two-tailed P-value of 0.05 was considered to represent statistical significance. The statistical software package SPSS, version 16.0 (SPSS Inc., Chicago, IL) was used for analysis. Median serum 25(OH)D status for participants was 81 nmol/L (range 22–158 nmol/L). Only four (8%) of the participants were considered vitamin D deficient, whereas 18 (38%) were under the 75 nmol/L of serum 25(OH)D considered by many to be optimal for bone health.⁷ At the bivariate level, a significant relationship was observed between TUG score and 25(OH)D status for women (Spearman $r_s = -0.412$, $P = 0.01$). This relationship can be interpreted as a tendency toward lower serum 25(OH)D status in participants who took longer to complete the TUG in this sample. No significant relationship was observed between handgrip strength and 25(OH)D status. Multiple linear regression was undertaken to identify independent determinants of TUG and handgrip strength. Age was observed to be a significant determinant of TUG and handgrip strength, whereas sex was a significant determinant of handgrip strength. Serum 25(OH)D was not observed to be a significant determinant for TUG or handgrip strength.

A significant number of the participants displayed suboptimal serum 25(OH)D status (<75 nmol/L), and although a recent study showed a high proportion of adults displaying suboptimal serum 25(OH)D in winter for this location, the finding that a significant number of older adults may also have lower than optimal serum 25(OH)D status during summer is troubling.⁶ For the associations between serum 25(OH)D and functional measures, it was observed that lower serum 25(OH)D status was associated with higher TUG test scores in women, a finding potentially important from a public health position. This is because of the association observed between higher TUG scores and greater fall risk in community-dwelling adults, a significant cause of morbidity in this population,⁸ although at the multivariable level, when potential confounders such as age were added, serum 25(OH)D was not observed to be a significant determinant of TUG score. It is likely that the serum 25(OH)D status of this population affected the lack of relationship seen at the multivariable level between functional measures and serum 25(OH)D status. For example, research has shown that the most significant improvements in muscle strength may occur between low levels of serum 25(OH)D, up to a level of 50 nmol/L.^{9,10} Thus, with few of the participants having serum 25(OH)D less than 50 nmol/L, this research adds further evidence that there may be a “threshold” at which the functional performance and risk of falling in populations with largely optimal serum 25(OH)D status may not be significantly improved with further increases in serum 25(OH)D status above 50 nmol/L.

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